ECOLOGY

Ecological issues

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Περιεχόμενα

[ECOLOGY 3](#_Toc509439207)

[1.Ecology 3](#_Toc509439208)

[2.Recycling 5](#_Toc509439209)

[3.Climate 6](#_Toc509439210)

[4.Carbon dioxide 8](#_Toc509439211)

[5.Global warming 10](#_Toc509439212)

[6. My family 12](#_Toc509439213)

# ECOLOGY

## 1.Ecology

Ecology (from Greek: οἶκος, "house", or "environment"; -λογία, "study of")[A] is the branch of biology[1] which studies the interactions among organisms and their environment. Objects of study include interactions of organisms with each other and with no organic components of their environment. Topics of interest include the biodiversity, distribution, biomass, and populations of organisms, as well as cooperation and competition within and between species. Ecosystems are dynamically interacting systems of organisms, the communities they make up, and the non-living components of their environment. Ecosystem processes, such as elemntary production, pedogenesis, mineral cycling, and niche construction, regulate the flux of energy and matter through an environment. These processes are sustained by organisms with special life history traits. Biodiversity means the varieties of species, genes, and ecosystems, enhances certain ecosystem services.

Ecology is not synonymous with environmentalism, natural history, or environmental science. It overlaps with the closely related sciences of evolutionary biology, genetics, and ethology. An important focus for ecologists is to improve the understanding of how biodiversity affects ecological function. Ecologists seek to explain:

* Life processes, interactions, and adaptations
* The movement of materials and energy through living communities
* The successional development of ecosystems

The abundance and distribution of organisms and biodiversity in the context of the environment.

Ecology has practical applications in conservation biology, wetland management, natural resource management (agroecology, agriculture, forestry, agroforestry, fisheries), city planning (urban ecology), community health, economics, basic and applied science, and human social interaction (human ecology). For example, the Circles of Sustainability approach treats ecology as more than the environment 'out there'. It is not treated as separate from humans. Organisms (including humans) and resources compose ecosystems which, in turn, maintain biophysical feedback mechanisms that moderate processes acting on living (biotic) and non-living (abiotic) components of the planet. Ecosystems sustain life-supporting functions and produce natural capital like biomass production (food, fuel, fiber, and medicine), the regulation of climate, global biogeochemical cycles, water filtration, soil formation, erosion control, flood protection, and many other natural features of scientific, historical, economic, or intrinsic value.

The word "ecology" ("Ökologie") was coined in 1866 by the German scientist Ernst Haeckel. Ecological thought is derivative of established currents in philosophy, particularly from ethics and politics.[2] Ancient Greek philosophers such as Hippocrates and Aristotle laid the foundations of ecology in their studies on natural history. Modern ecology became a much more rigorous science in the late 19th century. Evolutionary concepts relating to adaptation and natural selection became the cornerstones of modern ecological theory.

## 2.Recycling

Recycling is the process of converting waste materials into new materials and objects. It is an alternative to "conventional" waste disposal that can save material and help lower greenhouse gas emissions (compared to plastic production,[1][2] for example). Recycling can prevent the waste of potentially useful materials and reduce the consumption of fresh raw materials, thereby reducing: energy usage, air pollution (from incineration), and water pollution (from landfilling).

Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse, and Recycle" waste hierarchy.[3][4]

There are some ISO standards related to recycling such as ISO 15270:2008 for plastics waste and ISO 14001:2004 for environmental management control of recycling practice.

Recyclable materials include many kinds of glass, paper, and cardboard, metal, plastic, tires, textiles, and electronics. The composting or other reuse of biodegradable waste—such as food or garden waste—is also considered recycling.[2] Materials to be recycled are either brought to a collection center or picked up from the curbside, then sorted, cleaned, and reprocessed into new materials destined for manufacturing.

In the strictest sense, recycling of a material would produce a fresh supply of the same material—for example, used office paper would be converted into new office paper or used polystyrene foam into new polystyrene. However, this is often difficult or too expensive (compared with producing the same product from raw materials or other sources), so "recycling" of many products or materials involves their reuse in producing different materials (for example, paperboard) instead. Another form of recycling is the salvage of certain materials from complex products, either due to their intrinsic value (such as lead from car batteries, or gold from circuit boards), or due to their hazardous nature (e.g., removal and reuse of mercury from thermometers and thermostats).

## 3.Climate

Climate is the statistics of weather over long periods of time.[1][2] It is measured by assessing the patterns of variation in temperature, humidity, atmospheric pressure, wind, precipitation, atmospheric particle count and other meteorological variables in a given region over long periods of time. Climate differs from weather, in that weather only describes the short-term conditions of these variables in a given region.

A region's climate is generated by the climate system, which has five components: atmosphere, hydrosphere, cryosphere, lithosphere, and biosphere.[3]

The climate of a location is affected by its latitude, terrain, and altitude, as well as nearby water bodies and their currents. Climates can be classified according to the average and the typical ranges of different variables, most commonly temperature and precipitation. The most commonly used classification scheme was the Köppen climate classification. The Thornthwaite system,[4] in use since 1948, incorporates evapotranspiration along with temperature and precipitation information and is used in studying biological diversity and how climate change affects it. The Bergeron and Spatial Synoptic Classification systems focus on the origin of air masses that define the climate of a region.

Paleoclimatology is the study of ancient climates. Since direct observations of climate are not available before the 19th century, paleoclimates are inferred from proxy variables that include non-biotic evidence such as sediments found in lake beds and ice cores, and biotic evidence such as tree rings and coral. Climate models are mathematical models of past, present and future climates. Climate change may occur over long and short timescales from a variety of factors; recent warming is discussed in global warming. Global warming results in redistributions. For example, "a 3°C change in mean annual temperature corresponds to a shift in isotherms of approximately 300–400 km in latitude (in the temperate zone) or 500 m in elevation. Therefore, species are expected to move upwards in elevation or towards the poles in latitude in response to shifting climate zones".

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| LESSON | TOPIC | ASSIGNMENT | POINTS | DUE |
| 1 | What it distance learning | Wiki 1 | 10 | March 10 |
| presentation | 20 |  |
| 2 | History and theories | Brief paper | 20 | March 24 |
| Spring break | | | | |
| 3 | Distance learners | Discussion 1 | 10 | April 7 |
| Group project | 50 | April 14 |
| 4 | Media selection | Blog 1 | 10 | April 21 |

## 4.Carbon dioxide

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Carbon dioxide (chemical formula CO2) is a colorless gas with a density about 60% higher than that of dry air. Carbon dioxide consists of a carbon atom covalently double bonded to two oxygen atoms. It occurs naturally in Earth's atmosphere as a trace gas. The current concentration is about 0.04% (405 ppm) by volume, having risen from pre-industrial levels of 280 ppm. Natural sources include volcanoes, hot springs and geysers, and it is freed from carbonate rocks by dissolution in water and acids. Because carbon dioxide is soluble in water, it occurs naturally in groundwater, rivers and lakes, ice caps, glaciers and seawater. It is present in deposits of petroleum and natural gas. Carbon dioxide is odorless at normally encountered concentrations, however, at high concentrations, it has a sharp and acidic odor.[1]

As the source of available carbon in the carbon cycle, atmospheric carbon dioxide is the primary carbon source for life on Earth and its concentration in Earth's pre-industrial atmosphere since late in the Precambrian has been regulated by photosynthetic organisms and geological phenomena. Plants, algae and cyanobacteria use light energy to photosynthesize carbohydrate from carbon dioxide and water, with oxygen produced as a waste product.[4]

CO2 is produced by all aerobic organisms when they metabolize carbohydrates and lipids to produce energy by respiration.[5] It is returned to water via the gills of fish and to the air via the lungs of air-breathing land animals, including humans. Carbon dioxide is produced during the processes of decay of organic materials and the fermentation of sugars in bread, beer and wine making. It is produced by combustion of wood and other organic materials and fossil fuels such as coal, peat, petroleum and natural gas. On the other hand, it is an unwanted byproduct in many large scale oxidation processes, for example, in the production of acrylic acid (over 5 million tons/year).[6][7][8][9]

It is a versatile industrial material, used, for example, as an inert gas in welding and fire extinguishers, as a pressurizing gas in air guns and oil recovery, as a chemical feedstock and as a supercritical fluid solvent in decaffeination of coffee[10] and supercritical drying. It is added to drinking water and carbonated beverages including beer and sparkling wine to add effervescence. The frozen solid form of CO2, known as dry ice is used as a refrigerant and as an abrasive in dry-ice blasting.

Carbon dioxide is the most significant long-lived greenhouse gas in Earth's atmosphere. Since the Industrial Revolution anthropogenic emissions – primarily from use of fossil fuels and deforestation – have rapidly increased its concentration in the atmosphere, leading to global warming. The CO2 released into the atmosphere as a result of the use of fossil fuels "represents 99.4% of CO2 emissions in 2013".[11] Carbon dioxide also causes ocean acidification because it dissolves in water to form carbonic acid.[12]

## 5.Global warming

Global warming, also referred to as climate change, is the observed century-scale rise in the average temperature of the Earth's climate system and its related effects.[1][2] Multiple lines of scientific evidence show that the climate system is warming.[3][4][5] Many of the observed changes since the 1950s are unprecedented in the instrumental temperature record which extends back to the mid-19th century, and in paleoclimate proxy records covering thousands of years.[6]

In 2013, the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report concluded that "It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century."[7] The largest human influence has been the emission of greenhouse gases such as carbon dioxide, methane and nitrous oxide. Climate model projections summarized in the report indicated that during the 21st century, the global surface temperature is likely to rise a further 0.3 to 1.7 °C (0.5 to 3.1 °F) in the lowest emissions scenario, and 2.6 to 4.8 °C (4.7 to 8.6 °F) in the highest emissions scenario.[8] These findings have been recognized by the national science academies of the major industrialized nations[9][a] and are not disputed by any scientific body of national or international standing.[11][12]

Future climate change and associated impacts will differ from region to region.[13][14] Anticipated effects include increasing global temperatures, rising sea levels, changing precipitation, and expansion of deserts in the subtropics.[15] Warming is expected to be greater over land than over the oceans and greatest in the Arctic, with the continuing retreat of glaciers, permafrost and sea ice. Other likely changes include more frequent extreme weather events such as heat waves, droughts, heavy rainfall with floods and heavy snowfall;[16] ocean acidification; and species extinctions due to shifting temperature regimes. Effects significant to humans include the threat to food security from decreasing crop yields and the abandonment of populated areas due to rising sea levels.[17][18] Because the climate system has a large "inertia" and greenhouse gases will remain in the atmosphere for a long time, many of these effects will persist for not only decades or centuries, but for tens of thousands of years to come.[19]

Possible societal responses to global warming include mitigation by emissions reduction, adaptation to its effects, building systems resilient to its effects, and possible future climate engineering. Most countries are parties to the United Nations Framework Convention on Climate Change (UNFCCC),[20] whose ultimate objective is to prevent dangerous anthropogenic climate change.[21] Parties to the UNFCCC have agreed that deep cuts in emissions are required[22] and that global warming should be limited to well below 2.0 °C (3.6 °F) compared to pre-industrial levels,[b] with efforts made to limit warming to 1.5 °C (2.7 °F).[24]

Public reactions to global warming and concern about its effects are also increasing. A global 2015 Pew Research Center report showed that a median of 54% of all respondents asked consider it "a very serious problem". Significant regional differences exist, with Americans and Chinese (whose economies are responsible for the greatest annual CO2 emissions) among the least concerned.

## 6. My family